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THE STRUCTURE OF POLYPORUS GLOMERATUS PECK*

BY L. O. OVERHOLTS

Scarcely a single species of our native pore fungi has received less recognition than has *Polyporus glomeratus* Peck. On the other hand no plant is more worthy of specific rank than this same *P. glomeratus*. The species was described by Peck† in 1873 from specimens collected in New York state. Portions of the type specimens may still be seen at Albany and have been examined by the writer.

For many years after its publication the species remained unknown to other American mycologists. In 1885 Morgan‡ reported a species from the Miami Valley under the name *P. radiatus*. While that species probably occurs in Ohio Mr. C. G. Lloyd has stated§ that "he (Morgan) evidently told me that this (reference) was an error for *Polyporus glomeratus*, for I recorded it in pencil in my copy of his book" The specimens on which the record was based are preserved in the Lloyd Museum, but have not been examined by the writer. It may be safely asserted, however, that the name never reappeared in the literature on American mycology until in 1908. In that year Murrill|| listed it as a synonym of *Polyporus radiatus* (as *Inonotus radiatus*). This disposition of the name was concurred in by Lloyd until 1914. In that year, while examining the co-types of *P. glomeratus*, he discovered that the internal structure of the plant is entirely different from that of *P. radiatus*, and is almost unique among the pore fungi. Specimens were subsequently collected by Dr. C. H. Kauffman in Michigan. As far as known this was the third collection of the species to be made in this country.

Lloyd in 1915¶ called attention to the internal structure of the

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† Ann. Rep. N. Y. State Mus. 24: 78. 1873.

‡ Jour. Cinc. Soc. Nat. Hist. 6: 1885.

§ Letter No. 58, note 292, 1915.

|| North American Flora 9: 90, 1908.

¶ Letter No. 54, note 204, 1915.

plant and so gave to the species an adequate characterization. In the same year the writer received specimens of the plant from Dr. Kauffman and included the species in a manual* then ready for the press. The species was not included in the recent manuals prepared by Dr. Murrill.

As far as known the three collections previously mentioned were the only ones made up to the close of the year 1915. In July, 1916, Mr. A. S. Rhoads, of the New York State College of Forestry, collected it in abundance on a beech log at Cranberry Lake, New York. As many as three or more additional collections were made by Rhoads in the latter part of 1916, some of them on logs of *Acer rubrum*, the habitat of the type collection. Abundant specimens from these collections have been supplied the writer and a limited amount of material is available for purposes of exchange. Mr. Lloyd also reported receiving some additional collections within the past year, and one or more collections are in the herbarium of the New York Botanical Garden under *P. radiatus*. When once known well developed specimens need not be confused with *P. radiatus*, even without reference to the internal structure. In the summer of 1916 the type specimens at Albany were studied and other collections agree with them in all essential details.

The facts concerning the characteristic internal structure of the plant can be easily gathered from the illustrations submitted in this paper. Embedded in the internal tissue (trama) of the walls of the tubes are large, brown, thick-walled hyphae that vary up to 15μ in diameter and run parallel to the long axis of the tubes (Fig. 2). In longitudinal section of the hymenium they are readily made out but can never be traced to their origin. The reason for this will be apparent later. These hyphae usually end blindly and are largest just before they taper to the apex, as will be seen in the illustration (Fig. 5). In rare cases they project obliquely into the lumen of the tubes from between the basidia, but are not to be confused with the true setae that are also present at times. Those are of much smaller size and protrude from between the basidia at right angles to the tube axis.

* The Polyporaceae of the Middle Western United States, p. 51, 1915.

In cross sections of the hymenium these hyphae are, of course, cut transversely and appear as circular thick-walled rings made more conspicuous by the light they refract (Fig. 3). It is also seen that they vary much in diameter, from the maximum size down to such sizes that make them almost indistinguishable from the ordinary hyphae. There is no regularity in the distribution of these hyphae as revealed in cross sections.

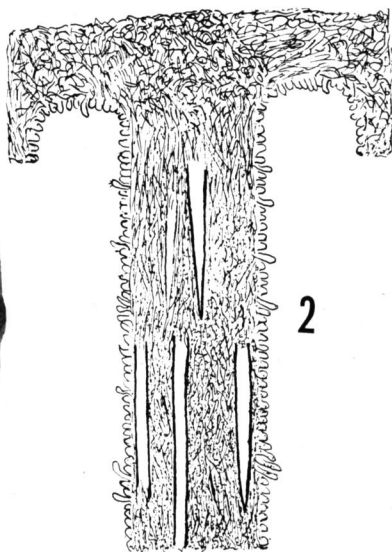
The writer was the first* to call attention to the fact that these peculiar hyphae are also present in great abundance in the context of the pileus. This fact makes the determination of the species an easy matter. Here the true nature of these hyphae becomes at once apparent if a bit of the context is teased out in KOH. They can be best described as having the general shape of setae but much larger in size. As stated previously and as will be seen from the illustration (Fig. 5) these bodies have a sharp-pointed apex and are largest just back of it. Farther back they gradually become smaller and smaller until they reach the diameter of the ordinary hyphae of the context and are indistinguishable from them. Consequently it must be admitted that these seta-like bodies are the modified ends of ordinary hyphae. Their origin also explains why they can not be traced for any considerable distance in sections as stated above.

It is difficult to even surmise what the function of these extraordinary bodies may be. No doubt their presence gives support to the sporophore and to the walls of tubes in which they occur, but it is doubtful if this can be considered more than an accidental function. The fact that the sporophores are not of the type to require such support, being much firmer than in many species, coupled with the knowledge that their duplicates are not known to exist in more than one or two other species of fungi and that fungi show very little hyphal differentiation of any sort, all point to the conclusion that at present they must be regarded as structures whose function is entirely unknown. It may be pointed out, however, that their presence in large numbers might be the means of deterring insects or other destructive animals of a smaller type from feeding upon the plants. Such a function has been

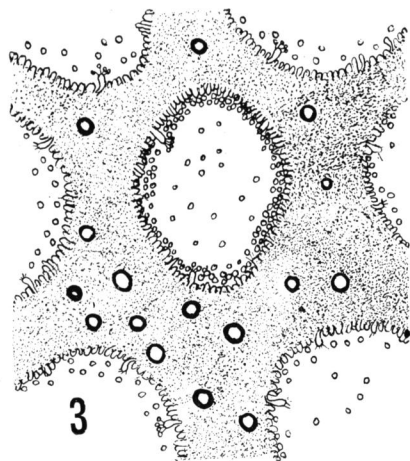
* Polyporaceae of the Middle Western United States, p. 51, 1915.



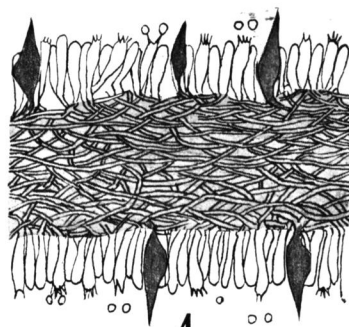
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Polyporus glomeratus. See text for explanation of figures.

suggested in the case of the typical setae and cystidia that project from between the basidia in many species of higher fungi.

An examination of the structure of *Polyporus radiatus* reveals the fact that no such bodies are present anywhere in that species. Consequently *P. glomeratus* can no longer be considered a synonym of that plant. This position (first expressed by Lloyd) is strengthened by the existence of other important distinguishing characters that will be mentioned below.

The only other temperate region species of similar internal structure so far discovered is *Poria Weirii* Murrill, described from specimens collected in Montana by Weir. Mr. Lloyd has called attention to the structure of that species but has apparently overlooked one important difference between it and *P. glomeratus*. In cross-sections of the hymenium the large embedded hyphae present about the same appearance as in the latter species. But longitudinal sections reveal the fact that the tips of the large brown hyphae do project from between the basidia as typical setae that can thus be traced for considerable distances into the trama. This is not the case in *P. glomeratus*.

True setae of the usual type have never been reported for *P. glomeratus*. In the New York specimens they are present and sometimes rather abundant, but at other times difficult to locate. They are here illustrated for the first time (Fig. 4). After much careful study it has been determined that there is apparently no connection between these setae and the enlarged embedded hyphal structures.

The spores of this species are of a bright yellow or slightly yellowish-green color. In one New York collection the imbricate pilei were thickly dusted over with the spores that had fallen from the hymenium of the next overlapping pileus. They are globose and measure 5–6 μ in diameter. The exact color of the spores of *P. radiatus* has been a matter on which accurate information is lacking. In sections they appear entirely hyaline under the microscope while the spores of *P. glomeratus* are decidedly colored.

A photograph of the species is included with this article (Fig. 1), and the plants described are on the basis of the recent New York specimens.

Pileus firm, sessile or more often effused-reflexed, $2-4 \times 2-10 \times 0.4-2$ cm., buffy-brown to snuff-brown or buckthorn-brown, but often olive-ochre or greenish yellow from the spores, rough and more or less uneven, minutely velvety-tomentose or becoming glabrous, at length covered by a distinct, hard crust; context brown, 0.3-1 cm. or more thick behind; tubes 3-7 mm. long, sometimes in two layers, olive green within, the mouths gray, brown, or greenish, angular, 4-6 per mm.; spores globose, smooth, greenish, yellow, $5-6\mu$ in diameter; setae absent or present but not abundant, projecting, brown; with elongated pointed setae-like hyphae, $8-12\mu$ in diameter in the trama and the context; hyphae $3-4\mu$.

On logs of maple and beech.

Known from New York, Ohio, and Michigan.

PENNSYLVANIA STATE COLLEGE

NEWS ITEMS

Those interested in the life of the late E. L. Greene and in Dr. Bartlett's account of it in *TORREYA* for July, 1916, will welcome another account of his life from a somewhat different angle in the *Catholic World* for October, 1917, where there is a twelve-page biographical sketch by Margaret B. Downing. Few, if any, of Dr. Greene's biographers seem to know of a forty-page article about him by Mrs. Brandegee in *Zoe* for April, 1893.

Dr. Carl Skottsberg delivered an illustrated lecture before the Club on November 13, on the island of Juan Fernandez. On November 20, with Mrs. Skottsberg, he sailed for Sweden, after an absence of thirteen months spent in botanical work in southern South America.